

CLAIMS

The following claims are pending and not amended:

1. (Previously Presented) A method for transmitting a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal wherein the method implements a transmultiplexer structure providing:

a modulation step, by a bank of synthesis filters, said bank of synthesis filters having $2M$ parallel branches, wherein M is an integer parameter, $M \geq 2$, each branch of the bank of synthesis filters being fed by source data and each comprising an expander of order M and a synthesis filter; and

a demodulation step, by a bank of analysis filters, said bank of analysis filters having $2M$ parallel branches, each branch of the bank of analysis filters comprising a decimator of order M and an analysis filter, and delivering representative data received from said source data,

said synthesis filters and analysis filters being derived from a predetermined prototype modulation function.

2. (Previously Presented) The transmission method according to claim 1, wherein said bank of synthesis filters and/or of said bank of analysis filters are grouped as a polyphase matrix, respectively.

3. (Previously Presented) The transmission method according to claim 2, wherein at least one of said polyphase matrices comprises a reverse Fourier transform with $2M$ inputs and $2M$ outputs.

4. (Previously Presented) The modulating method according to claim 12, wherein the method implements a reverse Fourier transform fed by $2M$ source data, each having undergone a predetermined phase shift, and feeding $2M$ filtering modules, each followed by an expander of

order M, the outputs of which are grouped then transmitted.

5. (Previously Presented) The modulation method according to claim 4, wherein the method delivers data $s[k]$ such that:

$$\begin{aligned}
 x_m^n(n) &= a_{m,n} e^{j\frac{\pi}{2}n} \\
 x_l^1(n) &= \sqrt{2} \sum_{k=0}^{2M-1} x_k^0(n) e^{j\frac{2\pi}{2M}k\frac{D-M}{2}} e^{j\frac{2\pi}{2M}kl} \\
 &= 2M\sqrt{2}IFFT\left(x_0^0, \dots, x_{2M-1}^0(n) e^{-j\frac{2\pi}{2M}(2M-1)\frac{D-M}{2}}\right)[l] \\
 x_l^2(n) &= \sum_{k=0}^{m=l} p(l+2kM)x_k^l(n-2k) \\
 s[k] &= \sum_{n=\left[\frac{k}{M}\right]-1}^{\left[\frac{k}{M}\right]} x_{k-nM}^2(n)
 \end{aligned}$$

wherein $D = \alpha M - \beta$,

with α an integer representing the reconstruction delay;

β an integer between 0 and M-1;

and $[.]$ is the "integral part" function.

6. (Previously Presented) The demodulating method according to claim 15, wherein the method implements a reverse Fourier transform fed by 2M branches, themselves fed by said transmitted signal, and each comprising a decimator of order M followed by a filtering module, and feeding 2M phase shift multipliers, delivering an estimation of the source data.

7. (Previously Presented) The demodulation method according to claim 6, wherein the method delivers data $\hat{a}_{m,n-\alpha}$ such that:

$$\hat{x}_l'^2(n-\alpha) = s[nM - \beta - l]$$

$$\hat{x}_l'^1(n-\alpha) = \sum_{k=0}^{m-1} p(l+2kM) \hat{x}_l'^2(n-\alpha-2k)$$

$$\begin{aligned} \hat{x}_l'^0(n-\alpha) &= \sqrt{2} e^{-j \frac{2\pi}{2M} l \frac{D+M}{2}} \sum_{k=0}^{2M-1} \hat{x}_l'^1(n-\alpha) e^{j \frac{2\pi}{2M} kl} \\ &= 2M \sqrt{2} e^{-j \frac{2\pi}{2M} l \frac{D+M}{2}} IFFT(\hat{x}_l'^1(n-\alpha), \dots, \hat{x}_{2M-1}'^1(n-\alpha)) [l] \end{aligned}$$

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$$\hat{a}_{m,n-\alpha} = \Re \left\{ e^{-j \frac{\pi}{2} (n-\alpha)} x_l'^0(n-\alpha) \right\}$$

with: $D = 2.s.M + d$,

wherein: s is an integer;

d is between 0 and $2M-1$.

8. (Previously Presented) The demodulation method according to claim 15, wherein said filtering modules are produced as one of the filters belonging to the group comprising:

transverse structure filters;

ladder structure filters; and

trellis structure filters.

9. (Previously Presented) The modulation method according to claim 15, wherein said

biorthogonal multicarrier signal comprises an orthogonal frequency division multiplex/offset modulation (OFDM/OM) signal.

10. (Canceled).

11. (Previously Presented) The method according to claim 1, wherein said biorthogonal multicarrier signal comprises an orthogonal frequency division multiplex/offset modulation (OFDM/OM) signal.

12. (Previously Presented) A method comprising modulating a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal, wherein the method implements a bank of synthesis filters having $2M$ parallel branches, wherein M is an integer parameter and $M \geq 2$, each branch of synthesis filters being fed by source data and each comprising an expander of order M and a synthesis filter, which is derived from a predetermined prototype modulation function.

13. (Previously Presented) The modulation method according to claim 12, wherein said filtering modules are produced as one of the filters belonging to the group comprising:

- transverse structure filters;
- ladder structure filters; and
- trellis structure filters.

14. (Previously Presented) The method according to claim 12, wherein said biorthogonal multicarrier signal comprises an orthogonal frequency division multiplex/offset modulation (OFDM/OM) signal.

15. (Previously Presented) A method comprising demodulating a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal wherein the method

implements a bank of analysis filters having $2M$ parallel branches, wherein M is an integer parameter and $M \geq 2$, each branch of analysis filters comprising a decimator of order M and an analysis filter, and delivering representative data received from source data, said analysis filter being derived from a predetermined prototype modulation function.

16. (Previously Presented) Apparatus comprising:

a modulating device for modulating a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal, comprising a bank of synthesis filters having $2M$ parallel branches, wherein M is an integer parameter and $M \geq 2$, each branch of synthesis filters being fed by source data and each comprising an expander of order M and a synthesis filter, which is derived from a predetermined prototype modulation function.

17. (Previously Presented) The apparatus according to claim 16, wherein the modulating device implements a reverse Fourier transform fed by $2M$ source data, each having undergone a predetermined phase shift, and feeding $2M$ filtering modules, each following by an expander of order M , the outputs of which are grouped then transmitted.

18. (Previously Presented) The apparatus according to claim 16, further including a demodulation device for demodulating a BFDM/OM biorthogonal multicarrier signal and comprising:

a bank of analysis filters having $2M$ parallel branches, each branch of analysis filters comprising a decimator of order M and an analysis filter, and delivering representative data received from source data, said analysis filter being derived from a predetermined prototype modulation function.

19. (Previously Presented) The apparatus according to claim 18, wherein the demodulation device implements a reverse Fourier transform fed by $2M$ branches, themselves fed by said transmitted signal, and each comprising a decimator of order M followed by a filtering module, and feeding $2M$ phase shift multipliers, delivering an estimation of the source data.

20. (Previously Presented) A demodulation device for demodulation a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal comprising:

a bank of analysis filters having $2M$ parallel branches, each branch of the bank of analysis filters comprising decimator of order M and an analysis filter, and delivering representative data received from source data, said analysis filter being derived from a predetermined prototype modulation function.

21. (Previously Presented) The demodulation device according to claim 20, further wherein the device implements a reverse Fourier transform fed by $2M$ branches, themselves fed by said transmitted signal, and each comprising a decimator of order M followed by a filtering module, and feeding $2M$ phase shift multipliers, delivering an estimation of the source data.